

Introduction

This Catalog summarizes the samples examined in the course of the Preliminary Examination (PE) Team (PET) of the Stardust Mission to comet Wild 2, and the results of the analyses of those samples. The Catalog is intended as a preliminary guide to the samples that are available for allocation to the larger planetary science community. Thus there is very detailed information about the samples that have been removed from the sample tray. In addition, there is enough detail about the samples that remain in the aerogel in the tray to permit investigators to request “fresher” samples as well.

Unlike the preliminary examination of the Apollo samples that was conducted by a small group of experts assembled at NASA’s Curatorial Facilities in Houston, the Stardust Preliminary Examination was widely distributed and involved over 200 individuals from a large number of institutions in approximately 28 countries. Stardust was a Discovery Class Mission led by the Principal Investigator (PI), Dr. Donald E. Brownlee of University of Washington, Seattle. Recognizing the need to access a wide variety of state-of-the-art analytical facilities, many of which are unique and available only at their home institutions, it was the Stardust Science Team’s desire to engage these laboratories in the PE, and to encourage broad participation by national and international researchers.

This broad participation required that the PE be organized into topical subgroups, each headed by a Team Lead. These groups were: (1) Mineralogy-Petrography, (2) Spectral Studies, (3) Bulk Composition, (4) Isotope Systematics, (5) Organic Components, and (6) Impact Features. Each group operated in a fairly autonomous manner, but the many interactions between subgroups assured that samples could be shared back and forth both within and between the groups to take maximum advantage of the samples.

The Stardust spacecraft launched on February 7, 1999, and encountered comet 81P/Wild-2 on January 2, 2004. Upon return to the Earth, the Sample Return Capsule (SRC) separated from the spacecraft bus and entered the atmosphere early in the morning on January 15, 2006, safely landing via parachute at the Utah Test & Training Range (UTTR) in Dugway, Utah. The SRC was removed from the spacecraft in the hours immediately following the recovery of the spacecraft at UTTR. Following transport of the SRC to Houston, the actual PE phase began on January 17, 2006, and terminated in August 2006 so that written summaries / reports could be prepared. The end of the PE phase also marked the end of the Stardust Mission at which time the Curatorial Office located at NASA’s Johnson Space Center in Houston, Texas, took complete control of the precious Stardust samples.

The principle inputs for this Catalog were generated by individual researchers and have been abridged and reformatted by the Curator. At the present time much of the actual data has been removed from the results, to give the individual researchers the opportunity to publish their results. Sufficient information has been included in the Catalog to permit investigators to intelligently request samples, and we anticipate that after a reasonable period of time all of the results from the PET effort will be available in an updated Catalog.

The basic organization is by aerogel cell number and sample number and type. Thus principal organizational headings are: (1) Aerogel cells, (2) Tracks, (3) Aluminum (Al) foils and associated craters, and (4) Misc. Samples. What we present here is an overview that summarizes the overall Stardust Mission, hardware- and sample-processing operations, and the tray-wide photodocumentation & surveys, along with the various techniques used to both document these extraterrestrial samples, as well as process or retrieve the actual cometary samples from with the capture medium (*i.e.*, silica aerogel).

A large number of individuals contributed to the sample characterizations and the successful Stardust Mission, including spacecraft designers, manufacturers, flight controllers, and recovery personnel at the Jet Propulsion Laboratory in Pasadena, and Lockheed Martin Space Systems, Denver. They all deserve thanks and praise for a job well done.

It is hoped that this catalog will be a useful resource that will stimulate scientific inquiry into the early solar system for a long time to come.